TEST REPORT

Reference No.	:	WTX24D11274664W004
Manufacturer*	:	Lumi United Technology Co., Ltd
Address	:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, Guangdong 518000, China
Factory	:	Lumi United Technology Co., Ltd
Address	:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, Guangdong 518000, China
Product	:	Hub M100
Model(s)	:	HM-G02E, HM-G02D
Brand Name	:	Aqara
Standards	:	ETSI EN 300 328 V2.2.2 (2019-07)
Date of Receipt sample	:	2024-11-27
Date of Test	:	2024-11-28 to 2024-12-19
Date of Issue	:	2024-12-26
Test Result	:	**Pass**

Remarks:
1. The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.
2. “*”**manufacturer** means any natural or legal person who manufactures radio equipment or has radio equipment designed or manufactured, and markets that equipment under his name or trade mark.

Prepared By:
Waltek Testing Group Co., Ltd.
Address: No. 77, Houjie Section, Guantai Road, Houjie Town, Dongguan City, Guangdong, China
Tel: +86-769-2267 6998
Fax: +86-769-2267 6828

Compiled by: Estel Qian

Estel Qian/ Project Engineer

Approved by: Deval Qin

Deval Qin / Designated Reviewer

2 Contents

3 Revision History

Test Report No.	Date of Receipt Sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTX24D11274664W004	2024-11-27	2024-11-28 to 2024-12-19	2024-12-26	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Hub M100
Model(s):	HM-G02E, HM-G02D
Model Description:	Only the model number and sale channels are different. The model HM-G02E was tested in this report.
Bluetooth Version:	V5.2
Hardware Version:	V1.1
Software Version:	V4.3.1_0008
Receiver Category:	2

4.2 Details of E.U.T.

Operation Frequency:	2402-2480MHz, 40 channels for BLE
Max. RF output power:	BLE 1M: -0.12dBm EIRP, BLE 2M: 0.04dBm EIRP
Type of Modulation:	GFSK
Antenna installation:	PCB Antenna
Antenna Gain:	0dBi

Note:
#: The antenna gain is provided by the applicant, and the applicant should be responsible for its authenticity, WALTEK lab has not verified the authenticity of its information.

Ratings:	Input: 5V⎓0.5A

4.3 Channel List

BLE mode

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

4.4 Additional Information

In accordance with ETSI EN 300 328, clause 5.4.1, the following information is provided by the manufacturer.

a) The type of wideband data transmission equipment:

☐ FHSS
☒ non-FHSS

b) In case of FHSS modulation:

- In case of non-Adaptive Frequency Hopping equipment:
  The number of Hopping Frequencies: 19
- In case of Adaptive Frequency Hopping Equipment:
  The maximum number of Hopping Frequencies:
  The minimum number of Hopping Frequencies:
  The (average) Dwell Time:

c) Adaptive / non-adaptive equipment:

☐ non-adaptive Equipment
☒ adaptive Equipment without the possibility to switch to a non-adaptive mode
☐ adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment
☐The equipment has implemented an LBT mechanism

- In case of non-FHSS equipment:
  ☐ The equipment is Frame Based equipment
  ☐ The equipment is Load Based equipment
  ☐ The equipment can switch dynamically between Frame Based and Load Based equipment
  The CCA time implemented by the equipment: .... µs

☒ The equipment has implemented a DAA mechanism
☐ The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.):
The maximum (corresponding) Duty Cycle: …………….
Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared): N/A

f) The worst case operational mode for each of the following tests:

- RF Output Power
  GFSK
- Power Spectral Density
  GFSK
- Duty cycle, Tx-Sequence, Tx-gap
  N/A
- Accumulated Transmit time, Frequency Occupation & Hopping Sequence (only for FHSS equipment)
  N/A
- Hopping Frequency Separation (only for FHSS equipment)
  N/A
- Medium Utilisation
  N/A
- Adaptivity & Receiver Blocking
  GFSK

- Nominal Channel Bandwidth
  GFSK
- Transmitter unwanted emissions in the OOB domain
  GFSK
- Transmitter unwanted emissions in the spurious domain
  GFSK
- Receiver spurious emissions
  GFSK

g) The different transmit operating modes (tick all that apply):

☒ Operating mode 1: Single Antenna Equipment
  ☒ Equipment with only one antenna
  ☐ Equipment with two diversity antennas but only one antenna active at any moment in time
  ☐ Smart Antenna Systems with two or more antennas, but operating in a (legacy) mode where only one antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)
☐ Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming
  ☐ Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ legacy mode)
  ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
  ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
NOTE 1: Add more lines if more channel bandwidths are supported.
☐ Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming
  ☐ Single spatial stream / Standard throughput (e.g. IEEE 802.11™ legacy mode)
  ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
  ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
NOTE 2: Add more lines if more channel bandwidths are supported.

h) In case of Smart Antenna Systems:

- The number of Receive chains: N/A
- The number of Transmit chains: N/A
  ☐ symmetrical power distribution
  ☐ asymmetrical power distribution

In case of beam forming, the maximum beam forming gain: N/A
NOTE: The additional beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: 2400 MHz to 2483.5 MHz
- Operating Frequency Range 2: .... MHz to .... MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Nominal Channel Bandwidth(s):

- Nominal Channel Bandwidth 1: 1MHz;
- Nominal Channel Bandwidth 2: .2 MHz

NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

☒ Stand-alone
☐ Combined Equipment
☐ Plug-in radio device
☐ Other ....

l) The normal and the extreme operating conditions that apply to the equipment:

Normal operating conditions (if applicable):
Operating temperature range: +21°C
Other (please specify if applicable): ……
Extreme operating conditions:
Operating temperature range: Minimum: -10°C Maximum +40°C

Other (please specify if applicable): …… Minimum: …… Maximum ……
Details provided are for the:
☒ Stand-alone
☐ Combined Equipment
☐ Test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:

- Antenna Type
  ☒ Integral Antenna (information to be provided in case of conducted measurements)
  Antenna Gain: 0dBi
  If applicable, additional beamforming gain (excluding basic antenna gain): .... dB
  ☒ Temporary RF connector provided
  ☐ No temporary RF connector provided
  ☐ Dedicated Antennas (equipment with antenna connector)
  ☐ Single power level with corresponding antenna(s)
  ☐ Multiple power settings and corresponding antenna(s)
  Number of different Power Levels: ....
  Power Level 1: .... dBm
  Power Level 2: .... dBm

NOTE 1: Add more lines in case the equipment has more power levels.

NOTE 2: These power levels are conducted power levels (at antenna connector).

- For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable

Power Level 1: .... dBm
Number of antenna assemblies provided for this power level: ....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 3: Add more rows in case more antenna assemblies are supported for this power level.

Power Level 2: .... dBm
Number of antenna assemblies provided for this power level: ....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 4 Add more rows in case more antenna assemblies are supported for this power level.

Power Level 3 .... dBm
Number of antenna assemblies provided for this power level: ....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 5Add more rows in case more antenna assemblies are supported for this power level.

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ☒ stand-alone equipment
☐ combined (or host) equipment
☐ test jig

Supply Voltage: ☐ AC mains State AC voltage: V
☒ DC State DC voltage 5V

In case of DC, indicate the type of power source

☐ Internal Power Supply
☐ External Power Supply or AC/DC adapter
☐ Battery
☐ Other: ....

o) Describe the test modes available which can facilitate testing:

The EUT can be into the Engineer mode for testing.

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™, IEEE 802.15.4™, proprietary, etc.):

proprietary

q) If applicable, the statistical analysis referred to in clause 5.3.1 q)

(to be provided as separate attachment)

r) If applicable, the statistical analysis referred to in clause 5.3.1 r)

(to be provided as separate attachment)

s) Geo-location capability supported by the equipment:

☐ Yes
☐ The geographical location determined by the equipment as defined in clause 4.3.1.13.2 or clause 4.3.2.12.2 is not accessible to the user.
☒ No

5 Test Summary

RF PART		
Test Items	**Test Requirement**	**Result**
RF output power	ETSI EN 300 328	PASS
Duty Cycle, Tx-sequence, Tx-gap	ETSI EN 300 328	N/A
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	ETSI EN 300 328	N/A
Hopping Frequency Separation	ETSI EN 300 328	N/A
Medium Utilisation (MU) factor	ETSI EN 300 328	N/A
Adaptivity (Adaptive Frequency Hopping)	ETSI EN 300 328	N/A
Receiver Blocking	ETSI EN 300 328	PASS
Occupied Channel Bandwidth	ETSI EN 300 328	PASS
Maximum spectral power density	ETSI EN 300 328	PASS
Transmitter unwanted emissions in the out-of-band domain	ETSI EN 300 328	PASS
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328	PASS
Receiver spurious emissions	ETSI EN 300 328	PASS
Geo-location capability	ETSI EN 300 328	N/A
Remark: N/A: Not Applicable RF: In this whole report RF means Radio Frequency.		

6 Equipment Used during Test

6.1 Equipments List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	Spectrum Analyzer	Agilent	N9020A	MY49100060	2024-07-18	2025-07-17
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	2024-07-18	2025-07-17
3.	Humidity Chamber	GF	GTH-225-40-1P	IAA061213	2024-07-18	2025-07-17
4.	EXA Signal Analyzer	Keysight	N9010A	MY50520207	2024-04-22	2025-04-21
5.	ESG VECTOR SIGNAL GENERATOR	Keysight	4438C	MY45092536	2024-04-22	2025-04-21
6.	EXG Analog Signal Generator	Malaysia Keysight	N5171B	MY53050845	2024-07-18	2025-07-17
7.	USB Wideband Power Sensor	Keysight	U2021XA	SG5440003	2024-04-22	2025-04-21
8.	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2024-07-21	2025-07-20
9.	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2024-04-22	2025-04-21
10.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2024-01-23	2025-01-22
11.	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2024-07-18	2025-07-17
12.	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2024-04-22	2025-04-21
13.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2024-07-18	2025-07-17
14.	Universal Radio Communication Tester	R&S	CMW500	127818	2024-04-22	2025-04-21

ETSI Test software

Software name	ETSI family
Software version	V2.2.2

6.2 Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.42dB
Power Spectral Density, conducted	±0.7dB
Unwanted Emissions, conducted	±2.76dB
Time	±5%
Duty Cycle	±5%
Temperature	±1°C
Humidity	±2%
DC and low frequency voltages	±0.1%
Conduction disturbance(150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±4.53dB
Radiated Emission(1GHz~6GHz)	±5.03dB

6.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

7 RF Requirements

1. Normal Test Conditions:

Ambient Condition:5VDC, 21 °C, 55 %RH

2. Extreme Test Conditions:

Extreme Temperature: -10°C to +40°C;

For tests at extreme temperatures, measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.

Test Conditions	Normal	LT	HT
Temperature (℃)	21	-10	40

3. Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Modulation	Test mode	Low channel	Middle channel	High channel
GFSK(BLE)	Transmitting	2402MHz	2440MHz	2480MHz
GFSK(BLE)	Receiving	2402MHz	2440MHz	2480MHz

7.1 RF Output power

7.1.1 Definition

The RF output power is defined as the mean equivalent isotropically radiated power (e.i.r.p.) of the equipment during a transmission burst.

7.1.2 Limit

The maximum RF output power for adaptive Frequency Hopping equipment shall be equal to or less than 20dBm.
The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.4.1 m). For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the manufacturer.
This limit shall apply for any combination of power level and intended antenna assembly.

7.1.3 EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

7.1.4 Test Procedure

Step 1:

• Use a fast power sensor suitable for 2.4 GHz and capable of minimum 1 MS/s.
• Use the following settings:
- Sample speed 1 MS/s or faster.
- The samples shall represent the RMS power of the signal.
- Measurement duration: For non-adaptive equipment: equal to the observation period defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured.

NOTE 1: For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.

Step 2:

• For conducted measurements on devices with one transmit chain:
- Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. Use these stored samples in all following steps.
• For conducted measurements on devices with multiple transmit chains:
- Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports.
- Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than 500 ns.
- For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples in all following steps.

Step 3:

• Find the start and stop times of each burst in the stored measurement samples.
The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2.

NOTE 2: In case of insufficient dynamic range, the value of 30 dB may need to be reduced appropriately.

Step 4:

• Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. Save these Pburst values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$

with 'k' being the total number of samples and 'n' the actual sample number

Step 5:

• The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

• Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.

• If applicable, add the additional beamforming gain "Y" in dB.

• If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.

• The RF Output Power (P) shall be calculated using the formula below:

$$P = A + G + Y$$

• This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.

7.1.5Measurement Record

BLE 1M:

Modulation	Test conditions		EIRP (dBm)		
GFSK(BLE)	Mode		Low	Middle	High
	Normal		-0.17	-0.77	-1.90
	Extreme	LT	-0.12	-0.73	-1.88
		HT	-0.16	-0.78	-1.93
	Max. radiated Power		-0.12		
Limit			≤100mW (20dBm)		
Remark: P = A + G + Y, G= 0dBi, Y=0dB					

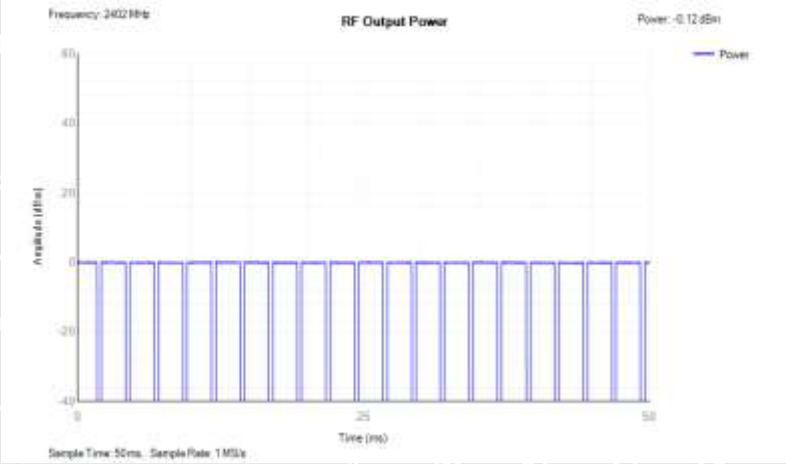
BLE 2M:

Modulation	Test conditions		EIRP (dBm)		
GFSK(BLE)	Mode		Low	Middle	High
	Normal		0.03	-0.59	-1.75
	Extreme	LT	0.04	-0.57	-1.72
		HT	-0.01	-0.61	-1.77
	Max. radiated Power		0.04		
Limit			≤100mW (20dBm)		
Remark: P = A + G + Y, G= 0dBi, Y=0dB					

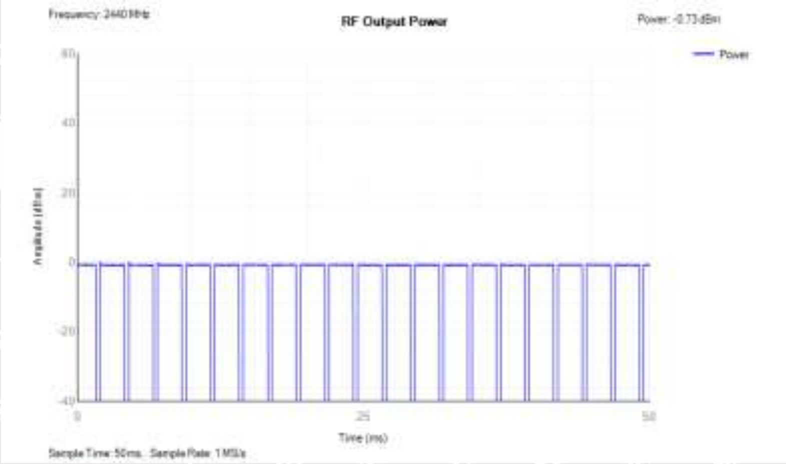
Test Plots

BLE 1M:

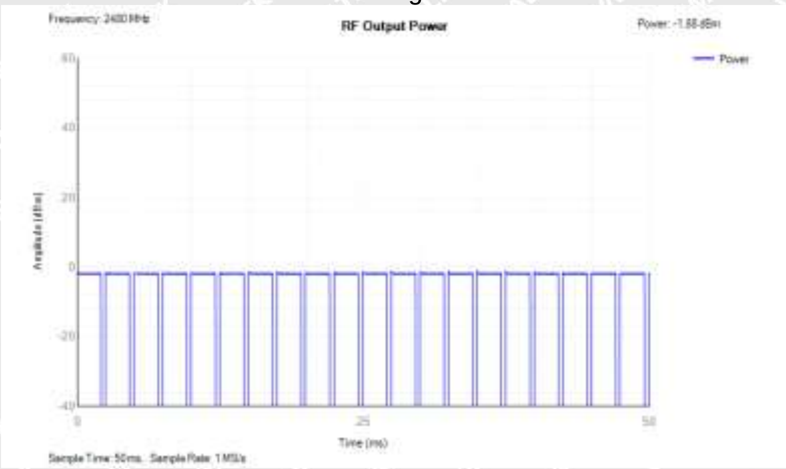
GFSK BLE Low Channel



GFSK BLE Middle Channel

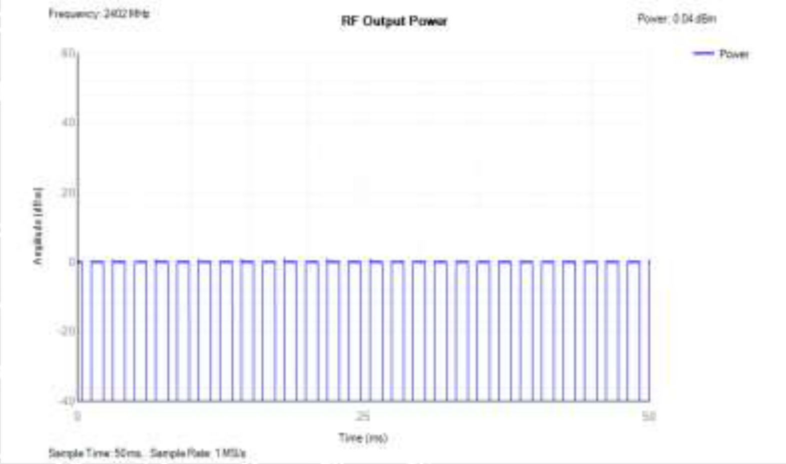


GFSK BLE High Channel

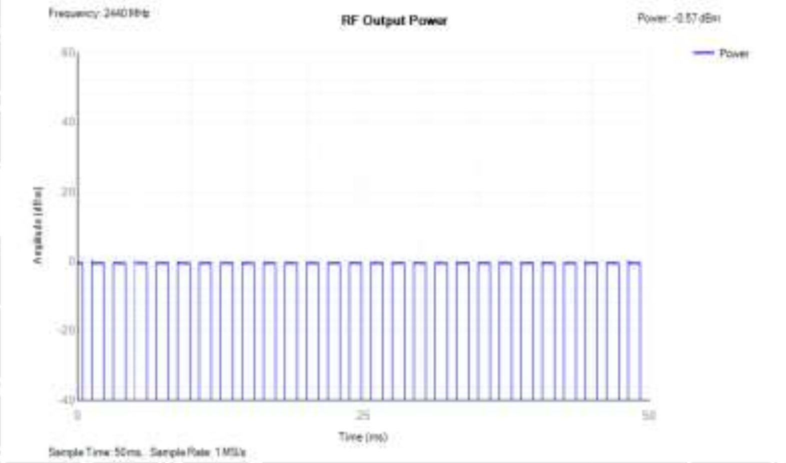


BLE 2M:

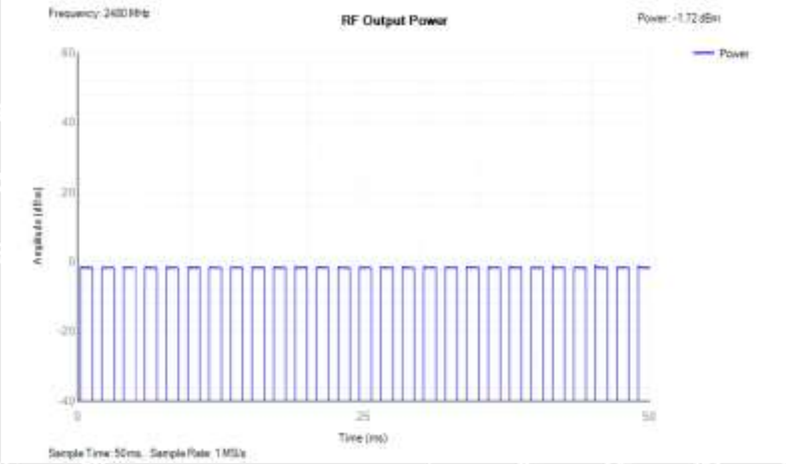
GFSK BLE Low Channel



GFSK BLE Middle Channel



GFSK BLE High Channel



7.2 Power Spectral Density

7.2.1Definition

The Power Spectral Density is the mean equivalent isotropically radiated power (e.i.r.p.) spectral density in a 1 MHz bandwidth during a transmission burst.

7.2.2Limit

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm per MHz.

7.2.3EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

7.2.4 Test Procedure

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

• Start Frequency: 2 400 MHz

• Stop Frequency: 2 483,5 MHz

• Resolution BW: 10 kHz

• Video BW: 30 kHz

• Sweep Points: > 8 350

NOTE: For spectrum analysers not supporting this number of sweep points, the frequency band may be segmented.

• Detector: RMS

• Trace Mode: Max Hold

• Sweep time: For non-continuous transmissions: 2 × Channel Occupancy Time × number of sweep points

For continuous transmissions: 10 s; the sweep time may be increased further until a value where the sweep time has no further impact anymore on the RMS value of the signal.

For non-continuous signals, wait for the trace to stabilize.

Save the data (trace data) set to a file.

Step 2:

For conducted measurements on smart antenna systems using either operating mode 2 or operating mode 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each sampling point (frequency domain), add up the coincident power values (in mW) for the different transmit chains and use this as the new data set.

Step 3:

Add up the values for power for all the samples in the file using the formula below.

$$P_{Sum} = \sum_{n=1}^{k} P_{sample}(n)$$

with 'k' being the total number of samples and 'n' the actual sample number

Step 4:

Normalize the individual values for power (in dBm) so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.4.2 and save the corrected data. The following formulas can be used:

$$C_{Corr} = P_{Sum} - P_{e.i.r.p.}$$

$$P_{Samplecorr}(n) = P_{Sample}(n) - C_{Corr}$$

with 'n' being the actual sample number

Step 5:

Starting from the first sample *PSamplecorr(n)* (lowest frequency), add up the power (in mW) of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to sample #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6:

Shift the start point of the samples added up in step 5 by one sample and repeat the procedure in step 5 (i.e. sample #2 to sample #101).

Step 7:

Repeat step 6 until the end of the data set and record the Power Spectral Density values for each of the 1 MHz segments.

From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT. This value, which shall comply with the limit given in clause 4.3.2.3.3, shall be recorded in the test report.

7.2.5Measurement Record

BLE 1M:

Modulation	Test conditions	EIRP (dBm/MHz)		
		Lower Channel	Middle Channel	High Channel
GFSK(BLE)	Normal	-0.18	-0.78	-1.93
Limit		≤10 dBm/MHz		
Remark: PSD = D + G + Y, G=0dBi, Y=0 dBm/MHz				

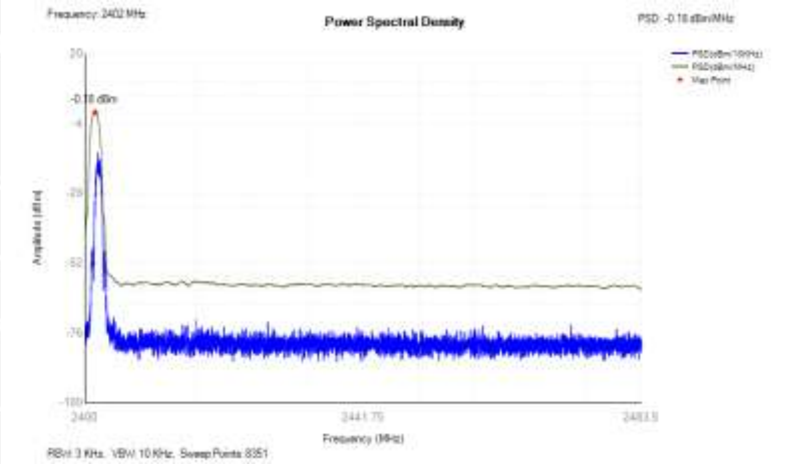
BLE 2M:

Modulation	Test conditions	EIRP (dBm/MHz)		
		Lower Channel	Middle Channel	High Channel
GFSK(BLE)	Normal	-1.14	-1.63	-2.88
Limit		≤10 dBm/MHz		
Remark: PSD = D + G + Y, G=0dBi, Y=0 dBm/MHz				

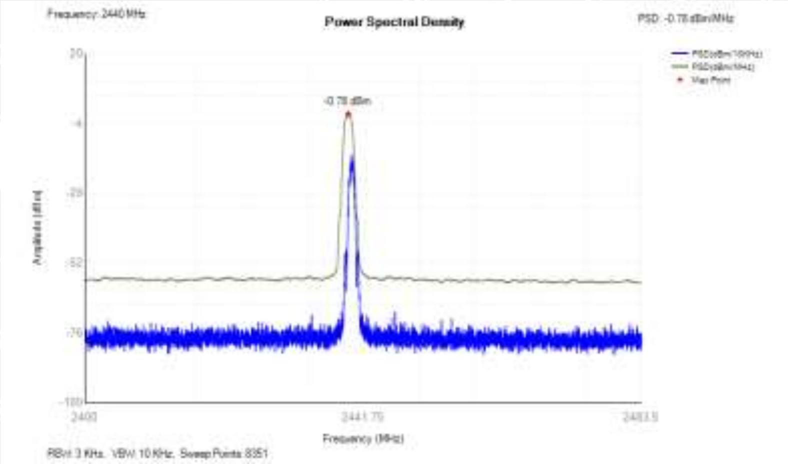
Test Plots

BLE 1M:

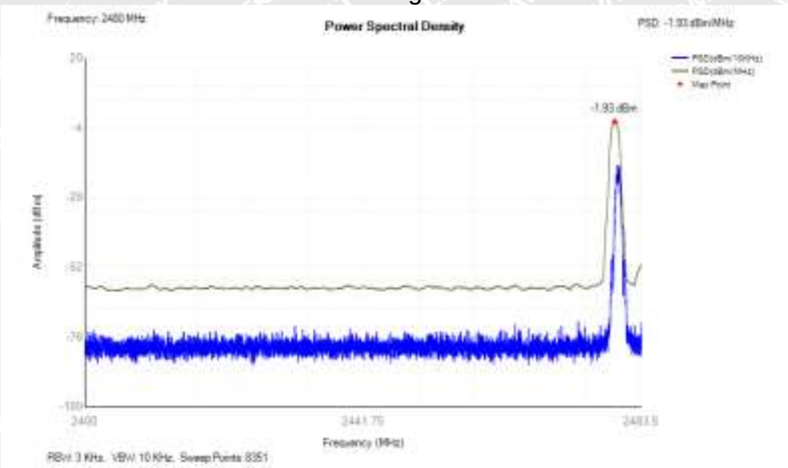
GFSK BLE Low Channel



GFSK BLE Middle Channel

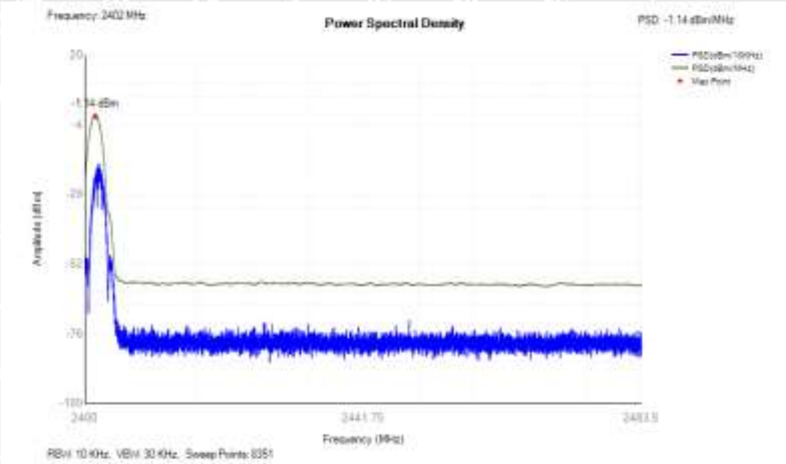


GFSK BLE High Channel

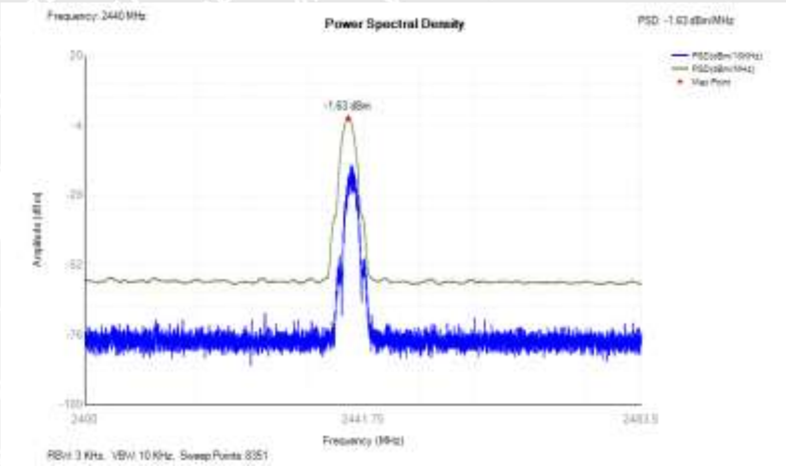


BLE 2M:

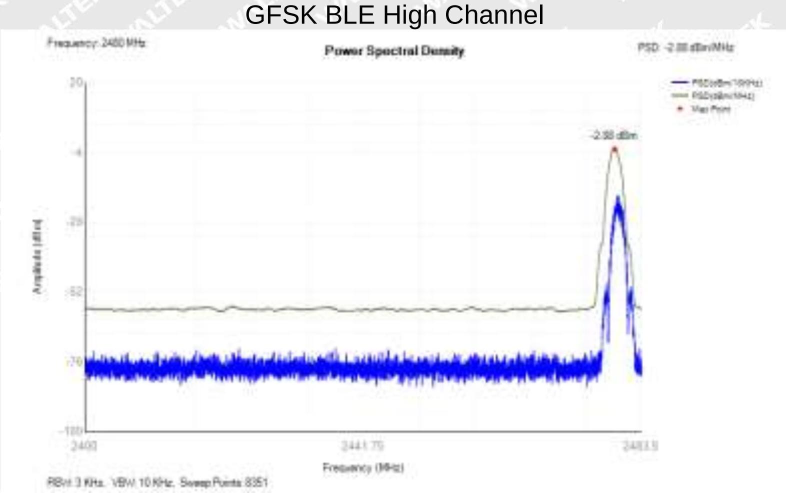
GFSK BLE Low Channel



GFSK BLE Middle Channel



GFSK BLE High Channel



7.3 Adaptivity (adaptive equipment using modulations other than FHSS)

7.3.1Adaptivity Definition

Non-LBT based Detect and Avoid is a mechanism for equipment using wide band modulations other than FHSS and by which a given channel is made 'unavailable' because an interfering signal was reported after the transmission in that channel. This mechanism shall operate as intended in the presence of an unwanted signal on frequencies other than those of the operating band.
LBT based Detect and Avoid is a mechanism by which equipment using wide band modulations other than FHSS,avoids transmissions in a channel in the presence of an interfering signal in that channel. This mechanism shall operate as intended in the presence of an unwanted signal on frequencies other than those of the operating band.
Short Control Signalling Transmissions are transmissions used by adaptive equipment to send control signals(e.g. ACK/NACK signals, etc.) without sensing the operating channel for the presence of other signals.
Adaptive equipment may or may not have Short Control Signalling Transmissions.

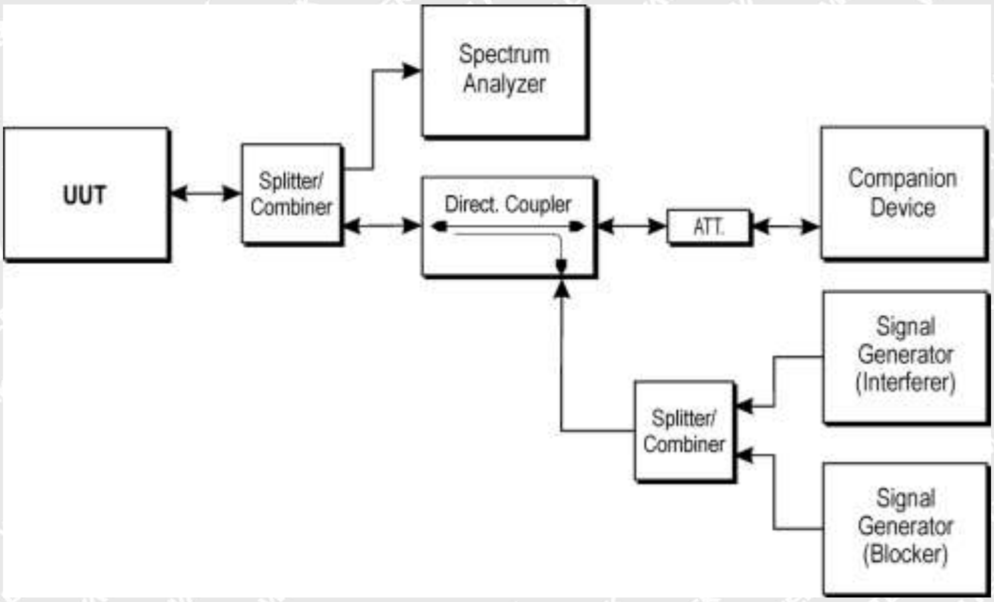
7.3.2Adaptivity Limit

Refer to section 4.3.2.6.2.2 and 4.3.2.6.3.2 and 4.3.2.6.4.2 of ETSI EN 300 328 V2.2.2

7.3.3EUT Operation Condition

The EUT was programmed to be in transmitting on mode.

7.3.4Test Procedure



7.3.5Measurement Record

The EIRP is less than 10dBm, so the test not applicable.

7.4 Receiver Blocking

7.4.1Receiver Blocking Definition

Receiver blocking is a measure of the ability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation in the presence of an unwanted signal (blocking signal) at frequencies other than those of the operating band.

7.4.2Receiver Blocking Limit

While maintaining the minimum performance criteria as defined in clause 4.3.2.11.4, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15 or table 16.

Table 14: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × $\log_{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × $\log_{10}$(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Table 15: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Table 16: Receiver Blocking parameters receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

The conformance tests for this requirement are defined in clause 5.4.11.

7.4.3EUT Operation Condition

The EUT was programmed to be in transmitting on mode.

7.4.4Test Procedure

For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.
Figure 6 shows the test set-up which can be used for performing the receiver blocking test.

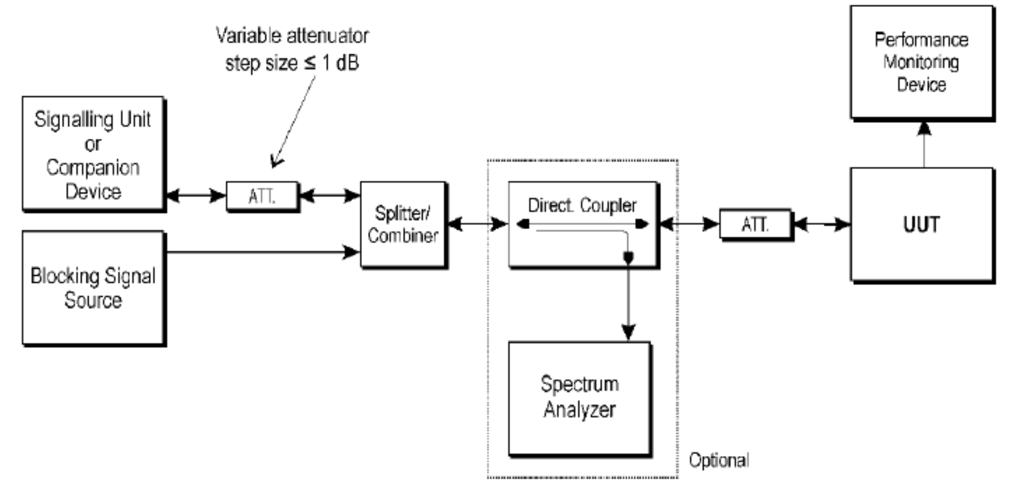


Figure 6: Test Set-up for receiver blocking

The procedure in step 1 to step 6 below shall be used to verify the receiver blocking requirement as described in clause 4.3.1.12 or clause 4.3.2.11.
Table 6, table 7 and table 8 in clause 4.3.1.12.4 contain the applicable blocking frequencies and blocking levels for each of the receiver categories for testing Receiver Blocking on frequency hopping equipment.
Table 14, table 15 and table 16 in clause 4.3.2.11.4 contain the applicable blocking frequencies and blocking levels for each of the receiver categories for testing Receiver Blocking on equipment using wide band modulations other than
FHSS.

Step 1:
• For non-frequency hopping equipment, the UUT shall be set to the lowest operating channel.

Step 2:
• The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:
• With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is Pmin.
• This signal level (Pmin) is increased by the value provided in the table corresponding to the receiver category and type of equipment.

Step 4:
• The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.

Step 5:
• Repeat step 4 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 6:
• For non-frequency hopping equipment, repeat step 2 to step 5 with the UUT operating at the highest operating channel.

7.4.5Measurement Record

BLE 1M:

Receiver Blocking parameters receiver category 3 equipment

Test Condition: Low Energy Mode (category 2 equipment)							
Modulation	**Test Channel (MHz)**	**Blocking Frequency(MHz)**	**Blocking Power(dB)**	**Measured PER(%)**	**Pmin (dbm)**	**Limit (%)**	**Result**
GFSK	2402	2380	-34	1.8	-58.91	10	PASS
		2504	-34	2.4		10	PASS
		2300	-34	1.3		10	PASS
		2584	-34	2		10	PASS
GFSK	2480	2380	-34	1.7	-58.91	10	PASS
		2504	-34	2.1		10	PASS
		2300	-34	1.9		10	PASS
		2584	-34	1.5		10	PASS

BLE 2M:

Receiver Blocking parameters receiver category 2 equipment

Test Condition: Low Energy Mode (category 2 equipment)							
Modulation	**Test Channel (MHz)**	**Blocking Frequency(MHz)**	**Blocking Power(dB)**	**Measured PER(%)**	**Pmin (dbm)**	**Limit (%)**	**Result**
GFSK	2402	2380	-34	2.5	-65.88	10	PASS
		2504	-34	1.1		10	PASS
		2300	-34	1.7		10	PASS
		2584	-34	2.3		10	PASS
GFSK	2480	2380	-34	1.1	-65.88	10	PASS
		2504	-34	2.1		10	PASS
		2300	-34	1.4		10	PASS
		2584	-34	1.9		10	PASS

NOTE: Pmin value is measured value

7.5 Occupied Channel Bandwidth

7.5.1Definition

The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal.

7.5.2Limit

The Occupied Channel Bandwidth shall fall completely within the band given in clause 1.
In addition, for non-adaptive equipment using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz...

7.5.3 EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

7.5.4Test Procedure

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

• Centre Frequency: The centre frequency of the channel under test

• Resolution BW: ~ 1 % of the span without going below 1 %

• Video BW: 3 × RBW

• Frequency Span: 2 × Nominal Channel Bandwidth

• Detector Mode: RMS

• Trace Mode: Max Hold

• Sweep time: 1 s

Step 2:

Wait for the trace to stabilize.

Find the peak value of the trace and place the analyser marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT.

This value shall be recorded.

NOTE: Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

7.5.5Measurement Record

BLE 1M:

Modulation	Frequency (MHz)	Frequency Range (MHz)		Occupied Channel (MHz)
GFSK(BLE)	Low	2401.49	/	1.022
	High	/	2480.512	1.022

BLE 2M:

Modulation	Frequency (MHz)	Frequency Range (MHz)		Occupied Channel (MHz)
GFSK(BLE)	Low	2400.975	/	2.052
	High	/	2481.027	2.053

Test Plot

BLE 1M:

Low Channel

High Channel

BLE 2M:

Low Channel

High Channel

7.6 Transmitter unwanted emissions in the out-of-band domain

7.6.1Definition

Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious.

7.6.2Limit

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.

NOTE: Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.2.7.

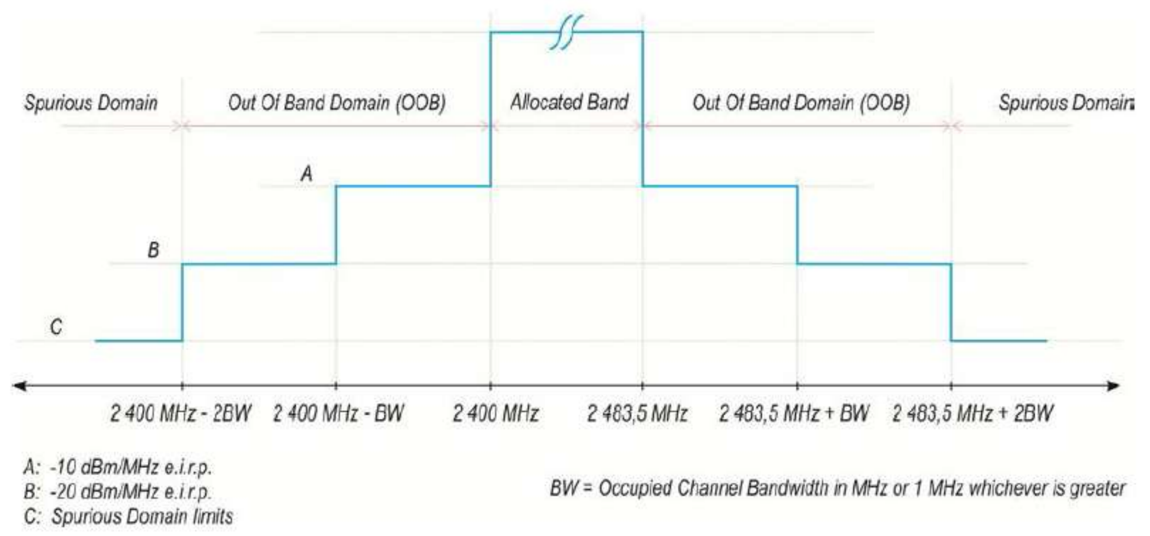


Figure 3: Transmit mask

7.6.3EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

7.6.4Test Procedure

The applicable mask is defined by the measurement results from the tests performed under clause 5.3.8 (Occupied Channel Bandwidth).

The test procedure is further as described under clause 5.3.9.2.1.

The Out-of-band emissions within the different horizontal segments of the mask provided in figures 1 and 3 shall be measured using the steps below. This method assumes the spectrum analyser is equipped with the Time Domain Power option.

Step 1:

• Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: 2 484 MHz

- Span: 0 Hz

- Resolution BW: 1 MHz

- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep Mode: Continuous
- Sweep Points: Sweep Time [s] / (1 μs) or 5 000 whichever is greater
- Trigger Mode: Video trigger

NOTE 1: In case video triggering is not possible, an external trigger source may be used.

- Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

Step 2 (segment 2 483,5 MHz to 2 483,5 MHz + BW):

• Adjust the trigger level to select the transmissions with the highest power level.

• For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.

• Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.

• Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

• Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3 (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW):

• Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 4 (segment 2 400 MHz - BW to 2 400 MHz):

• Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 5 (segment 2 400 MHz - 2BW to 2 400 MHz - BW):

• Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 6:

• In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits

provided by the mask given in figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3.

- Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by

10 × log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE 2: Ach refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.

7.6.5Measurement Record

BLE 1M:

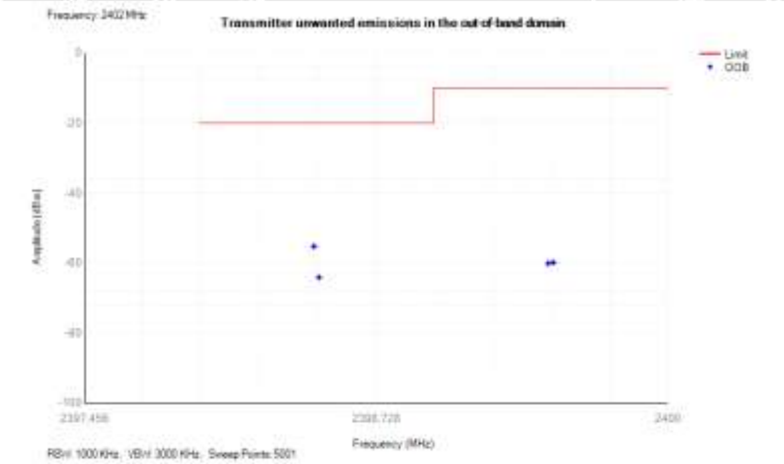
Mode	GFSK BLE Low channel		Mode	GFSK BLE High channel	
Frequency	**Level**	**Limit**	**Frequency**	**Level**	**Limit**
(MHz)	(dBm)	(dBm)	(MHz)	(dBm)	(dBm)
2399.5	-59.87	-10	2484	-62.85	-10
2399.478	-60.16	-10	2484.022	-63.15	-10
2398.478	-64.12	-20	2485.022	-63.72	-20
2398.456	-55.28	-20	2485.044	-66.48	-20

BLE 2M:

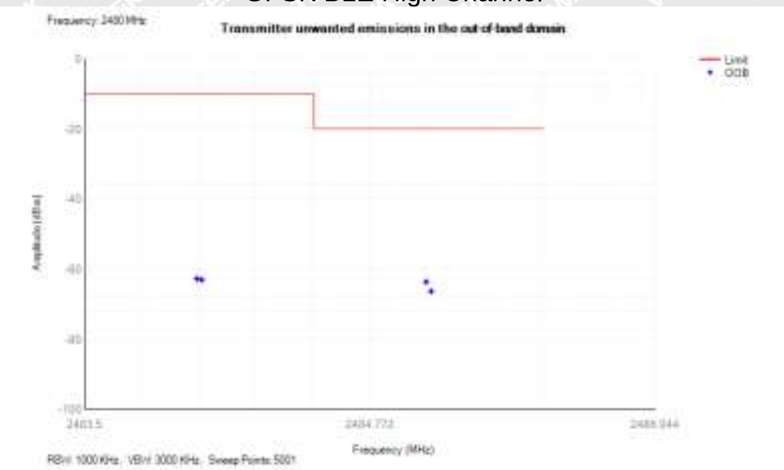
Mode	GFSK BLE Low channel		Mode	GFSK BLE High channel	
Frequency	**Level**	**Limit**	**Frequency**	**Level**	**Limit**
(MHz)	(dBm)	(dBm)	(MHz)	(dBm)	(dBm)
2399.5	-37.17	-10	2484	-63.47	-10
2398.5	-59.1	-10	2485	-66.23	-10
2398.448	-60.25	-10	2485.053	-66.33	-10
2397.448	-65.05	-20	2486.053	-66.87	-20
2396.448	-66.13	-20	2487.053	-59.74	-20
2396.396	-66.3	-20	2487.106	-59.79	-20

Test Plots
BLE 1M:

GFSK BLE Low Channel

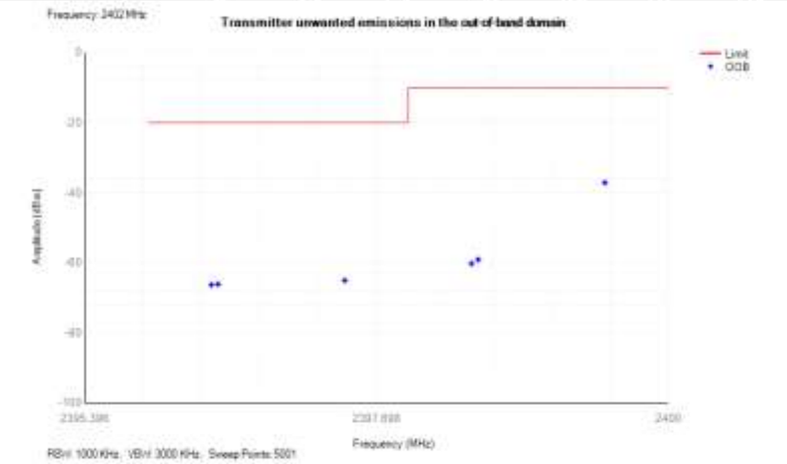


GFSK BLE High Channel

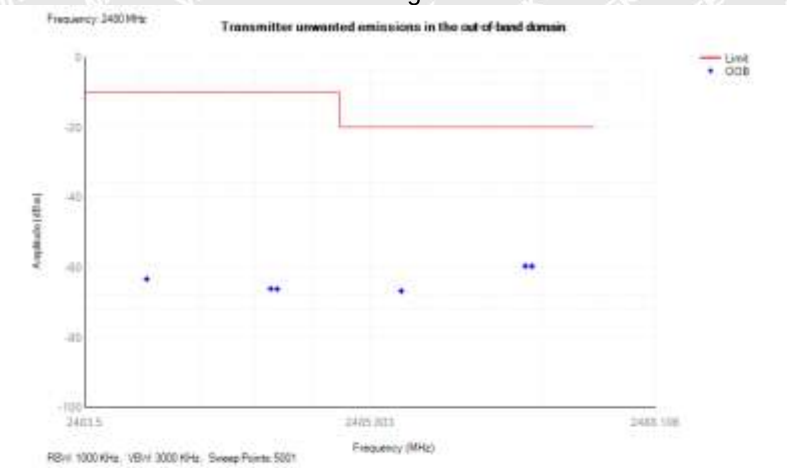


BLE 2M:

GFSK BLE Low Channel



GFSK BLE High Channel



7.7 Transmitter unwanted emissions in the spurious domain

7.7.1Definition

Transmitter unwanted emissions in the spurious domain are emissions outside the allocated band and outside the out-of-band domain as indicated in figure 1 when the equipment is in Transmit mode.

7.7.2Limit

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 12.

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

Table 12: Transmitter limits for spurious emissions

Frequency range	Maximum power,e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87.5 MHz	-36 dBm	100 kHz
87.5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 694 MHz	-54 dBm	100 kHz
694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

7.7.3EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

7.7.4Test Procedure

The test site as described in annex B and applicable measurement procedures as described in annex C shall be used.

The test procedure is further as described under clause 5.4.9.2.1

7.7.5Measurement Record

BLE 1M:

Test Condition: Normal Mode (GFSK of BLE Low channel)										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Limit	Margin
			Height	Polar	SG Level	Cable	Antenna Gain			
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
348.19	51.10	120	1.3	H	-49.40	0.18	0.00	-49.58	-36	-13.58
348.19	51.30	51	1.1	V	-48.03	0.18	0.00	-48.21	-36	-12.21
4804.00	51.84	213	1.9	H	-58.31	2.30	11.50	-49.11	-30	-19.11
4804.00	53.60	111	1.5	V	-54.59	2.30	11.50	-45.39	-30	-15.39
7206.00	48.32	69	1.0	H	-58.21	2.90	12.00	-49.11	-30	-19.11
7206.00	47.34	227	1.8	V	-59.48	2.90	12.00	-50.38	-30	-20.38
Test Condition: Normal Mode (GFSK of BLE High channel)										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Limit	Margin
			Height	Polar	SG Level	Cable	Antenna Gain			
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
348.19	49.90	322	1.8	H	-50.60	0.18	0.00	-50.78	-36	-14.78
348.19	51.09	233	1.7	V	-48.26	0.18	0.00	-48.44	-36	-12.44
4960.00	51.96	242	1.1	H	-57.67	2.40	11.60	-48.47	-30	-18.47
4960.00	54.09	46	1.3	V	-54.47	2.40	11.60	-45.27	-30	-15.27
7440.00	48.51	218	1.3	H	-58.73	3.00	11.90	-49.83	-30	-19.83
7440.00	48.02	323	1.9	V	-57.37	3.00	11.90	-48.47	-30	-18.47

BLE 2M:

Test Condition: Normal Mode (GFSK of BLE Low channel)										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Limit	Margin
			Height	Polar	SG Level	Cable	Antenna Gain			
(MHz)	(dBµV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
348.19	50.48	301	1.9	H	-50.02	0.18	0.00	-50.20	-36	-14.20
348.19	50.65	104	1.9	V	-48.70	0.18	0.00	-48.88	-36	-12.88
4804.00	53.91	160	1.7	H	-55.55	2.30	11.50	-46.35	-30	-16.35
4804.00	53.30	94	1.7	V	-54.89	2.30	11.50	-45.69	-30	-15.69
7206.00	47.88	131	1.7	H	-58.65	2.90	12.00	-49.55	-30	-19.55
7206.00	47.12	277	1.8	V	-59.70	2.90	12.00	-50.60	-30	-20.60
Test Condition: Normal Mode (GFSK of BLE High channel)										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Limit	Margin
			Height	Polar	SG Level	Cable	Antenna Gain			
(MHz)	(dBµV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
348.19	50.33	13	1.2	H	-50.17	0.18	0.00	-50.35	-36	-14.35
348.19	50.40	90	1.1	V	-48.95	0.18	0.00	-49.13	-36	-13.13
4960.00	54.62	336	1.6	H	-55.01	2.40	11.60	-45.81	-30	-15.81
4960.00	52.82	74	1.4	V	-55.74	2.40	11.60	-46.54	-30	-16.54
7440.00	48.44	217	1.2	H	-58.80	3.00	11.90	-49.90	-30	-19.90
7440.00	47.08	281	1.7	V	-58.31	3.00	11.90	-49.41	-30	-19.41

Note: For the margin less than 6dB points, per pre-scan, the RMS value is lower than Peak. So no recorded.

7.8 Receiver spurious emissions

7.8.1Definition

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

7.8.2Limit

The spurious emissions of the receiver shall not exceed the values given in table 13.
In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or for emissions radiated by integral antenna equipment (without antenna connectors),these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Table 13: Spurious emission limits for receivers

Frequency range	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

7.8.3EUT Operation Condition

The EUT was programmed to be in continuously receiving mode.

7.8.4Test Procedure

The test site as described in annex B and applicable measurement procedures as described in annex C shall be used.
The test procedure is further as described under clause 5.4.10.2.1.

7.8.5Measurement Record

BLE 1M:

Test Condition: Normal Mode: GFSK of BLE Low channel										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Limit	Margin
			Height	Polar	SG Level	Cable	Antenna Gain			
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
152.76	38.27	329	1.9	H	-71.44	0.15	0.00	-71.59	-57	-14.59
152.76	38.50	248	1.6	V	-68.49	0.15	0.00	-68.64	-57	-11.64
1649.18	39.95	344	1.3	H	-73.43	0.34	10.50	-63.27	-47	-16.27
1649.18	42.08	48	1.3	V	-70.55	0.34	10.50	-60.39	-47	-13.39
Test Condition: Normal Mode: GFSK of BLE High channel										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Limit	Margin
			Height	Polar	SG Level	Cable	Antenna Gain			
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
152.76	37.55	296	1.0	H	-72.16	0.15	0.00	-72.31	-57	-15.31
152.76	39.36	332	1.6	V	-67.63	0.15	0.00	-67.78	-57	-10.78
1649.18	38.68	253	1.6	H	-74.70	0.34	10.50	-64.54	-47	-17.54
1649.18	43.05	62	1.5	V	-69.58	0.34	10.50	-59.42	-47	-12.42

BLE 2M:

Test Condition: Normal Mode: GFSK of BLE Low channel										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Limit	Margin
			Height	Polar	SG Level	Cable	Antenna Gain			
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
152.76	39.14	352	1.3	H	-70.57	0.15	0.00	-70.72	-57	-13.72
152.76	38.55	2	1.6	V	-68.44	0.15	0.00	-68.59	-57	-11.59
1649.18	40.54	203	1.9	H	-72.84	0.34	10.50	-62.68	-47	-15.68
1649.18	42.17	202	1.2	V	-70.46	0.34	10.50	-60.30	-47	-13.30
Test Condition: Normal Mode: GFSK of BLE High channel										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Limit	Margin
			Height	Polar	SG Level	Cable	Antenna Gain			
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
152.76	39.50	131	1.6	H	-70.21	0.15	0.00	-70.36	-57	-13.36
152.76	38.78	225	1.7	V	-68.21	0.15	0.00	-68.36	-57	-11.36
1649.18	41.04	18	1.4	H	-72.34	0.34	10.50	-62.18	-47	-15.18
1649.18	41.39	209	1.1	V	-71.24	0.34	10.50	-61.08	-47	-14.08

8 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-HM-G02E-Photos.

======End of Report======